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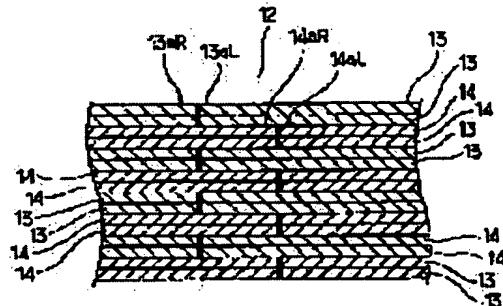
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## (54) STATOR CORE FOR ROTATING MACHINE AND MANUFACTURE THEREOF

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To minimize the number of fitting positions, improve ease of assembly, and restrain an increase in iron loss, by making a development core annular which is formed by layering a set of two first core plates layered and a set of second core plates layered alternately, and fitting and connecting both ends thereof for formation of a stator core.

**SOLUTION:** A set of two first core plates 13 and a set of second core plates 14 are layered alternately to form a development core. An irregularity consisting of a group of the ends 13aL and 14aL of respective core plates 13, 14, and a irregularity consisting of a group ends 13aR and 14aR are fitted, welded in the layering direction, and made annular to form a stator core 12. It is thus possible to minimize the number of fitting positions, improve ease of assembly, and restrain an increase in iron loss.



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**CLAIMS**

[Claim(s)]

[Claim 1] The 1st iron core board of the gestalt which connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section Piece section of magnetic pole teeth It is the stator core of the rotation electrical machinery equipped with the above, and while carrying out the laminating of two of the iron core boards of the above 1st and considering as a lot, it is characterized by considering as the composition which carries out the laminating of two of the iron core boards of the above 2nd, considers as a lot, constructs two iron core board [ a set of ] \*\* of these 1st, and the 2nd two iron core boards, and carries out the laminating of the \*\* by turns.

[Claim 2] The stator core of the rotation electrical machinery according to claim 1 characterized by carrying out beveling formation of the portion which serves as an acute angle among the corners for both ends of each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board.

[Claim 3] The stator core of the rotation electrical machinery according to claim 1 characterized by forming the crevice for connection section welding which serves as a concave seen from the direction of a laminating by the edge and other end of one of these at the connection section of an expansion core in the gestalt which circularized the expansion core.

[Claim 4] The stator core of the rotation electrical machinery according to claim 1 characterized by forming the crevice for iron core board welding in the periphery section of a unit yoke.

[Claim 5] The stator core of the rotation electrical machinery according to claim 1 characterized by forming the crevice for iron core board welding in the point of magnetic pole teeth.

[Claim 6] The 1st iron core board of the gestalt which connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section Piece section of magnetic pole teeth It is the manufacture method of the stator core equipped with the above, and while carrying out the laminating of two of the iron core boards of the above 1st and considering as a lot, it is characterized by having carried out the laminating of two of the iron core boards of the above 2nd, having considered as the lot, constructing two iron core board [ a set of ] \*\* of these 1st, and the 2nd two iron core boards, and carrying out the laminating of the \*\* by turns.

[Claim 7] Passing around the steel plate for iron cores the 1st iron core board and whose 2nd iron core board are iron core board materials, pierce by turns and it is formed. At the time of this punching, the portion between opposite edges of the piece section of a unit yoke of the 1st iron core in the steel plate for iron cores is pierced to the 1st punch. Similarly the portion between opposite edges of the piece section of a unit yoke of the 2nd iron core in the steel plate for iron cores is pierced to the 2nd punch. Similarly the portion between the edge of the piece section of a unit yoke of the 1st iron core board in the steel plate for iron cores and the edge of the piece section of a unit yoke of the 2nd iron core board is the manufacture method of the stator core according to claim 6 characterized by being pierced with the 1st punch and the 2nd punch.

[Claim 8] The manufacture method of the stator core according to claim 6 characterized by carrying out beveling formation of the portion which serves as an acute angle among the corners for both ends of

each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board.

[Claim 9] The manufacture method of the stator core according to claim 6 characterized by the crevice for connection section welding which serves as a concave seen from the direction of a laminating being formed of one edge and other end of the connection section of an expansion core, and making it weld by them in the gestalt which circularized the expansion core in this crevice for connection section welding.

[Claim 10] The manufacture method of the stator core according to claim 6 characterized by forming the crevice for iron core board welding in the periphery section of a unit yoke, and making it weld in this crevice for iron core board welding.

[Claim 11] The manufacture method of the stator core according to claim 6 characterized by forming the crevice for iron core board welding in the point of magnetic pole teeth, and making it weld in this crevice for iron core board welding.

[Claim 12] The 1st iron core board of the gestalt which connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section Piece section of magnetic pole teeth It is the manufacture method of the stator core equipped with the above, and is characterized by piling up the piece section of a connector of each aforementioned iron core board in the direction of a laminating one by one at the time of the aforementioned laminating.

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## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the manufacturing installation of the stator core of the rotation electrical machinery formed by circularizing an expansion core and connecting the both ends, and a stator core.

[0002]

[Problem(s) to be Solved by the Invention] The stator 1 of the conventional rotation electrical machinery is shown in drawing 18 or drawing 21. This stator 1 loops a stator core 2 around a coil 3, and is constituted, and the stator core 2 is constituted as follows. That is, the expansion core 6 which carries out the laminating of the 1st iron core board 4 and the 2nd iron core board 5 by turns, and is first shown in drawing 20 is constituted. It is formed in the gestalt which the 1st iron core board 4 connected piece section of six unit yoke 4a as shown in drawing 19 (a), and was connected by piece section 4b, and each piece section of unit yoke 4a comes to have piece section of magnetic pole teeth 4c. In this case, the right end portion of each piece section of unit yoke 4a differs in an angle from a left end portion. Moreover, as the 2nd iron core board 5 is shown in drawing 19 (b), it is the same composition, and it has piece section of unit yoke 5a, piece section of connector 5b, and piece section of magnetic pole teeth 5c, and the right end portion of each piece section of unit yoke 5a differs in an angle from a left end portion.

[0003] Furthermore, the right end portion of piece section of unit yoke 4a of the 1st iron core board 4 and the right end portion of piece section of unit yoke 5a of the 2nd iron core board 5 differ from an angle (a configuration is a difference). As for the left end portion of piece section of unit yoke 4a of the 1st iron core board 4, an angle differs also from the left end portion of piece section of unit yoke 5a of the 2nd iron core board 5 (configurations differ).

[0004] Therefore, if the expansion core 6 which carries out the laminating of these iron core boards 4 and 5 by turns, and is shown in drawing 20 is constituted, the place which unit yoke 6a which has magnetic pole teeth 6c ties to this expansion core 6, and is formed in one through section 6b will come. In this case, at the both ends of unit yoke 6a, it becomes irregularity-like (refer to drawing 21) for every sheet of the iron core boards 4 and 5.

[0005] After looping magnetic pole teeth 6a in this expansion core 6 around the aforementioned coil 3, the expansion core 6 is crooked and circularized by the connector section 6b, and a stator 1 is constituted, while carrying out weldbonding of the ends, connecting them, having them and constituting a stator core 2. As shown in drawing 21 at the time of this circularization, the amount of [ which adjacent unit yoke 6a counters ] edge fits in mutually. That is, the amount of [ of the 1st iron core board 4 ] edge shifts to a hoop direction to a part for the edge of the 2nd iron core board 5, and it becomes the gestalt which moreover carries out a lap seen from the direction of a laminating.

[0006] However, conventionally [ above-mentioned ], with composition, since the iron core boards 4 and 5 are considered as the composition from which the edge shifts for every sheet, there is a problem that there are many fitting parts in the case of circularization, and it is a little inferior to assembly nature.

Although it considered carrying out the laminating of the iron core boards 4 and 5 by turns every two or more sheets that this should be solved, depending on the number of sheets, iron loss is large and investigation of this invention person showed the bird clapper.

[0007] this invention is made in view of an above-mentioned situation, and the purpose is to offer the manufacture method of the stator core of the rotation electrical machinery which iron loss is large and can suppress a bird clapper, and a stator core while aiming at improvement in assembly nature.

[0008]

[Means for Solving the Problem] The 1st iron core board of the gestalt which the stator core of the rotation electrical machinery of a claim 1 connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section, With the gestalt which connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section, and by carrying out the laminating of the 2nd iron core board with which the configuration for both ends of this piece section of a unit yoke differs from the 1st iron core board While constituting the expansion core which two or more unit yokes which have magnetic pole teeth follow through the connector section of one By constituting so that the amount of [ of a unit yoke ] both ends may make irregularity, circularizing this expansion core, fitting in and connecting a part for the both ends While the amount of [ a part for the edge of each magnetic pole yoke of the 1st iron core board and / of each magnetic pole yoke of the 2nd iron core board ] edge carries out the laminating of two of the iron core boards of the above 1st and they consider as a lot in the stator core of the rotation electrical machinery made into the gestalt which shifts to a hoop direction It has the feature at the place considered as the composition which carries out the laminating of two of the iron core boards of the above 2nd, considers as a lot, and carries out the laminating of the two iron core board lot of these 1st, and the 2nd two iron core board lot by turns.

[0009] According to investigation of this invention person, the following thing was understood. That is, when the laminating of the 2nd iron core board is carried out for the 1st iron core board, as a result of carrying out a laminating by turns by having made predetermined number of sheets into the lot, respectively and measuring the iron loss, when it considered as this two-sheet lot, and one sheet was made into a lot and number of sheets increased [ iron loss seldom changed but ] with a three-sheet lot, a four-sheet lot, and --, the bird clapper found iron loss greatly rapidly. Moreover, about assembly nature, since a fitting part decreases as it increases with an one-sheet lot, a two-sheet lot, a three-sheet lot, and --, it becomes easy.

[0010] However, it sets in the invention composition of the above-mentioned claim 1. While carrying out the laminating of two of the 1st iron core board and considering as a lot, the increase in iron loss can be suppressed aiming at improvement in a shell and assembly-operation nature considered as the composition which carries out the laminating of two of the 2nd iron core board, considers as a lot, and carries out the laminating of the two iron core board lot of these 1st, and the 2nd two iron core board lot by turns.

[0011] The stator core of the rotation electrical machinery of a claim 2 has the feature at the place which carried out beveling formation of the portion which serves as an acute angle among the corners for both ends of each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board. It is with one part for an edge and other-end portion of the piece section of a unit yoke, and a side serves as an acute angle either. If this acute-angle portion exists, when circularizing from the state of an expansion core, other iron core boards may be damaged in the acute-angle portion. When magnetic pole teeth are equipped with a coil in the stage before circularizing an expansion core especially, there is a possibility that the above-mentioned acute-angle portion may damage this coil, at the time of circularization. However, in the above-mentioned composition, neither an iron core board nor a coil is damaged in the case of the shell which carried out beveling formation of the portion which serves as an acute angle among the corners for both ends of each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board, and circularization.

[0012] The stator core of the rotation electrical machinery of a claim 3 has the feature in the gestalt which circularized the expansion core at the place in which the crevice for connection section welding

which serves as a concave seen from the direction of a laminating by the edge and other end of one of these at the connection section of an expansion core is formed. In this composition, if it welds in the crevice for connection section welding when joining one edge and other-end section of the connection section of an expansion core by welding, the padding of welding does not project from a stator core.

[0013] The stator core of the rotation electrical machinery of a claim 4 has the feature at the place which formed the crevice for iron core board welding in the periphery section of a unit yoke. Although each iron core board may be welded in the periphery section of a unit yoke when unifying two or more iron core boards by which the laminating was carried out, the padding of welding may project from the periphery section of a unit yoke in this case. However, in the above-mentioned composition, padding does not project in the periphery section by welding in the shell which formed the crevice for iron core board welding in the periphery section of a unit yoke, and this crevice portion.

[0014] The stator core of the rotation electrical machinery of a claim 5 has the feature at the place which formed the crevice for iron core board welding in the point of magnetic pole teeth. Although each iron core board may be welded by the point of the magnetic pole teeth of a unit yoke when unifying two or more iron core boards by which the laminating was carried out, the padding of welding may project from the point of magnetic pole teeth in this case. For this reason, there is a possibility that the gap of a stator core and Rota may become large. However, in the above-mentioned composition, padding does not project from a magnetic pole teeth point by welding in the shell which formed the crevice for iron core board welding in the point of magnetic pole teeth, and this crevice portion. Therefore, the gap of a stator core and Rota does not become large.

[0015] The 1st iron core board of the gestalt which the manufacture method of the stator core of a claim 6 connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section, With the gestalt which connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section, and by carrying out the laminating of the 2nd iron core board with which the configuration for both ends of this piece section of a unit yoke differs from the 1st iron core board While forming the expansion core which two or more unit yokes which have magnetic pole teeth follow through the connector section of one By forming so that the amount of [ of a unit yoke ] both ends may make irregularity, circularizing this expansion core, fitting in and connecting a part for the both ends While the amount of [ a part for the edge of each magnetic pole yoke of the 1st iron core board and / of each magnetic pole yoke of the 2nd iron core board ] edge carries out the laminating of two of the iron core boards of the above 1st and they consider as a lot in the method of manufacturing the stator core of the gestalt which shifts to a hoop direction It has the feature at the place which carries out the laminating of two of the iron core boards of the above 2nd, considers as a lot, and was made to carry out the laminating of the two iron core board lot of these 1st, and the 2nd two iron core board lot by turns.

[0016] In the above-mentioned method, the laminating of the 1st two iron core board lot and the 2nd two iron core board lot is carried out by turns. While the amount of [ a part for the edge of the unit yoke piece section of the 1st two iron core board lot and / of the unit yoke piece section of the 2nd two iron core board lot ] edge aims at improvement in the shell it was made to shift to a hoop direction, and assembly-operation nature, the increase in iron loss can be suppressed.

[0017] The manufacture method of the stator core of a claim 7 the 1st iron core board and the 2nd iron core board Passing around the steel plate for iron cores which is an iron core board material, pierce by turns and it is formed. The portion between edges to which the piece section of a unit yoke of the 1st iron core in the steel plate for iron cores counters at the time of this punching is pierced to the 1st punch. The portion between edges which the piece section of a unit yoke of the 2nd iron core in the steel plate for iron cores similarly counters is pierced to the 2nd punch. Similarly the portion between the edge of the piece section of a unit yoke of the 1st iron core board in the steel plate for iron cores and the edge of the piece section of a unit yoke of the 2nd iron core board has the feature at the place pierced with the 1st punch and the 2nd punch.

[0018] Since the 1st iron core board and the 2nd iron core board are pierced by turns and formed in this method, passing around the steel plate for iron cores which is an iron core board material The 1st punch

for piercing the portion between edges which it excels in productivity and the piece section of a unit yoke of the 1st iron core in the steel plate for iron cores counters in this case, The 2nd punch for piercing the portion between edges which the piece section of a unit yoke of the 2nd iron core in the steel plate for iron cores similarly counters is used. Since the portion between the edge of the piece section of a unit yoke of the 1st iron core board in the steel plate for iron cores and the edge of the piece section of a unit yoke of the 2nd iron core board is similarly pierced, the punch number can be lessened.

[0019] The manufacture method of the stator core of a claim 8 has the feature at the place which carried out beveling formation of the portion which serves as an acute angle among the corners for both ends of each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board. In the above-mentioned method, neither an iron core board nor a coil is damaged in the case of the shell which carried out beveling formation of the portion which serves as an acute angle among the corners for both ends of each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board, and circularization.

[0020] In the gestalt which circularized the expansion core, the crevice for connection section welding which serves as a concave seen from the direction of a laminating by one edge and other end of the connection section of an expansion core is formed, and the manufacture method of the stator core of a claim 9 has the feature at the place welded in this crevice for connection section welding. In this method, since it welds in the crevice for connection section welding when joining one edge and other end of the connection section of an expansion core by welding, the padding of welding does not project from a stator core.

[0021] The manufacture method of the stator core of a claim 10 forms the crevice for iron core board welding in the periphery section of a unit yoke, and has the feature at the place welded in this crevice for iron core board welding. In the above-mentioned method, the crevice for iron core board welding is formed, and padding does not project in the periphery section of a unit yoke by welding in this crevice portion.

[0022] The manufacture method of the stator core of a claim 11 forms the crevice for iron core board welding in the point of unit teeth, and has the feature at the place welded in this crevice for iron core board welding. In this method, the crevice for iron core board welding is formed in the point of magnetic pole teeth, and the shell and padding which were welded in this crevice portion do not project from a magnetic pole teeth point.

[0023] The 1st iron core board of the gestalt which the manufacture method of the stator core of a claim 12 connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section, With the gestalt which connected two or more piece sections of a unit yoke which have the piece section of magnetic pole teeth, and was connected in the piece section, and by carrying out the laminating of the 2nd iron core board with which the configuration for both ends of this piece section of a unit yoke differs from the 1st iron core board While forming the expansion core which two or more unit yokes which have magnetic pole teeth follow through the connector section of one By forming so that the amount of [ of a unit yoke ] both ends may make irregularity, circularizing this expansion core, fitting in and connecting a part for the both ends It has the feature at the place where the amount of [ a part for the edge of each magnetic pole yoke of the 1st iron core board and / of each magnetic pole yoke of the 2nd iron core board ] edge piled up the piece section of a connector of each aforementioned iron core board in the direction of a laminating one by one in the method of manufacturing the stator core of the gestalt which shifts to a hoop direction, at the time of the aforementioned laminating.

[0024] Although the edges of a \*\*\*\*\* unit yoke fit in when circularizing the expansion core to which the laminating of the iron core board was carried out, by being crooked in the connector portion of each iron core board at this time, the portion is compressed and it upheaves slightly. Since the piece section of a connector of each iron core board has lapped in the direction of a laminating one by one, this protrusion contacts one by one in the direction of a laminating. Thereby, the crevice for two protrusion height occurs between each iron core board. This serves as the following advantage and appears. That is, although it circularizes an expansion core and the edge parts of a \*\*\*\*\* unit yoke fit in, when the

above-mentioned crevice occurs, the fitting margin cost for the crevice is made, and the fitting becomes easy. Incidentally, if the connector portion of each iron core board has shifted to the hoop direction, between each iron core board, even protrusion height generates only the crevice between parts, but is got blocked, and there will be little fitting margin cost and it will be hard coming to carry out the above-mentioned fitting. In addition, since the height of the above-mentioned protrusion is very few, it is rare for big influence to appear in magnetic properties.

[0025]

[Embodiments of the Invention] Hereafter, it explains, referring to drawing 1 or drawing 11 per 1st example of this invention. The stator 11 of rotation electrical machinery (inner rotor type) is first shown in drawing 2. This stator 11 equips magnetic pole teeth 15c of a stator core 12 with a coil 16, and is constituted. The manufacture method of this stator coil 12 is described.

[0026] The 1st iron core board 13 is shown in drawing 3 (a), and the 2nd iron core board 14 is shown in this drawing (b). First, if the 1st iron core board 13 is described, this is constituted from a steel plate for iron cores which is a material for iron core boards by punching processing mentioned later. This 1st iron core board 13 is formed in the gestalt which connected piece section of six unit yoke 13a, and was connected by piece section 13b, and each piece section of unit yoke 13a comes to have piece section of magnetic pole teeth 13c. And it inclines so that right end 13aR may make the predetermined angle alpha for the shape of a perpendicular to left end 13aL to nothing mostly in left end 13aL (in view of a piece section of unit yoke 13a core left-hand side edge) of each piece section of unit yoke 13a, as shown in drawing 4 (a).

[0027] The 2nd iron core board 14 as well as the 1st iron core board 13 is pierced, and is formed of processing (it mentions later), as shown in (b) of drawing 3, it is formed in the gestalt which connected piece section of six unit yoke 14a, and was connected by piece section 14b, and each piece section of unit yoke 14a comes to have piece section of magnetic pole teeth 14c. And it inclines so that left end 14aL may make the predetermined angle beta for the shape of a perpendicular to right end 14aR to nothing mostly in right end 14aR of each piece section of unit yoke 14a, as shown in drawing 4 (b). In this case, although the aforementioned angle alpha is the same as an angle beta as a size, the inclination directions differ.

[0028] By carrying out the laminating of the 1st above-mentioned iron core board 13 and the 2nd iron core board 14 by turns by the two-sheet lot, respectively, as shown in drawing 5, the expansion core 15 is constituted. In this expansion core 15, unit yoke 15a is formed of each piece sections 13a and 14a of a unit yoke of each iron core boards 13 and 14, similarly, the piece sections 13b and 14b of a connector tie, section 15b is formed, and magnetic pole teeth 15c is formed of the piece sections 13c and 14c of magnetic pole teeth. And each above-mentioned piece sections 13b and 14b of a connector did not shift in the direction of a laminating one by one, and are piled up. In this expansion core 15, as shown in drawing 6, left end 13aL and 14aL groups become irregularity-like, and right end 13aR and 14aR groups have also become irregularity-like (it is concave to a convex and the other party convex to the other party concave) by the reverse relation.

[0029] After the expansion core 15 is constituted as mentioned above, magnetic pole teeth 15c is equipped with a coil 16 (refer to drawing 7), this expansion core 15 is connected, it is crooked in section 15b, and the whole is circularized (the state is shown in drawing 7 in the middle of this circularization). the time of this circularization -- drawing 6 -- setting -- each -- the irregularity by edge 13aL and 14aL groups and the irregularity by 13aR and 14aR groups fit in This fitting state is shown in drawing 1 (this is the arrow B-B line cross section of drawing 7). And the edge 13aR portion of a set of the 1st two iron core boards 13 and the edge 14aL portion of a set of the 2nd two iron core boards 14 shift to a hoop direction (it is a longitudinal direction at drawing 1 ) relatively, and are carrying out the lap seen from the direction of a laminating (it is the vertical direction at drawing 1 ) so that this drawing 1 may show.

[0030] The circularization final state is shown in drawing 2 as stated above, and is set in this state. Edge 13aR and 14aR portions (sign 15R shows this portion to drawing 5, drawing 7, and drawing 2) on the right-hand side of [ re- ] the expansion core 15, Of edge 13aL and 14aL portions (sign 15L shows this

portion to drawing 5, drawing 7, and drawing 2) on the left-hand side of re-, the crevice 17 for connection section welding used as the concave of about V typefaces is formed seen from the direction of a laminating. And this crevice 17 portion for edge welding is arc-welded in the direction of a laminating, for example. A stator 11 is formed while a stator core 12 is formed of circularization of the above-mentioned expansion core 15.

[0031] In addition, punching processing of the iron core board 13 of the above 1st and the 2nd iron core board 14 is described with reference to drawing 8 and drawing 9. It pierces to drawing 8 (a), the outline composition of the press equipment 18 for processing is seen and shown from the side, and the transection flat surface in the punch portion of this equipment 18 is shown in this drawing (b). This press equipment 18 has punch-holder 18a, the various punch 19 prepared in this or 32, a guide 33, and a die 34, and is constituted. The above-mentioned punch 19 or 32 descends alternatively to proper timing.

[0032] The characteristic place of punching processing performed using this press equipment 18 is described. The steel plate 35 for iron cores which is the material of the 1st iron core board 13 and the 2nd iron core board 14 is around passed in the direction shown by Arrow C as shown in this drawing (a). And as shown in this drawing (c), (d), and (e), each iron core boards 13 and 14 stand in a row in the steel plate 35 for iron cores, it is formed in it by turns, and this is formed in the state of 2 trains. When the single tier of the bottom in drawing 8 is seen at this time, it becomes like drawing 9.

[0033] In the single tier of drawing 9, the portion S13 (this is a portion in the steel plate 35 for iron cores in fact) between edge 13aR of piece section of unit yoke 13a of the 1st iron core 13 and 13aL(s) is now pierced with the punch 32 equivalent to the 1st punch. The portion S14 (this is also a portion in the steel plate 35 for iron cores in fact) between edge 14aL of piece section of unit yoke 14a of the 2nd iron core 14 and 14aR(s) is pierced with the punch 30 equivalent to the 2nd punch. And the portion Sk (this is also a portion in a steel plate 35 in fact) between edge 13aR of piece section of unit yoke 13a of the 1st iron core board 13 and edge 14aL of piece section of unit yoke 14a of the 2nd iron core board 14 is pierced to the above-mentioned punch 32 and 30.

[0034] In addition, in the single tier of the top in drawing 8, partial [ between edge 13aR of piece section of unit yoke 13a of the 1st iron core 13 and 13aL(s) ] S13' is pierced with the punch 29 with which this is also equivalent to the 1st punch, and partial [ between edges ] S14' of piece section of unit yoke 14a of the 2nd iron core 14 is pierced with the punch 31 equivalent to the 2nd punch.

[0035] And partial Sk' between edge 13aR of piece section of unit yoke 13a of the 1st iron core board 13 and edge 14aL of piece section of unit yoke 14a of the 2nd iron core board 14 is pierced to the above-mentioned punch 29 and 31. As mentioned above, the feature is in the place which also pierced the portion of another configuration using the 1st punch 32 (29) and the 2nd punch 30 (31).

[0036] While according to such this example carrying out the laminating of two of the 1st iron core board 13 and considering as a lot, the increase in iron loss can be suppressed aiming at improvement in a shell and assembly-operation nature considered as the composition which carries out the laminating of two of the 2nd iron core board 14, considers as a lot, and carries out the laminating of the two-sheet lot of the iron core board 13 of these 1st, and the two-sheet lot of the 2nd iron core board 14 by turns.

[0037] That is, this invention person's results of an investigation are shown in drawing 10. If iron loss seldom changes in the case of an one-sheet lot and a two-sheet lot but it becomes more than a three-sheet lot when a laminating is carried out to the 1st iron core board 13 and the 2nd iron core board 14 the whole predetermined number of sheets, respectively as shown in this drawing, iron loss will become large rapidly. It is thought that a middle iron core board is in a gestalt and a bird clapper without the gap with the iron core board of the direction upper and lower sides of a laminating if this reason becomes more than a three-sheet lot although the 1st iron core board 13 and the 2nd iron core board 14 shift at a hoop direction in the case of an one-sheet lot and a two-sheet lot although it is not clear, and a lap is carried out in the direction of a laminating. Moreover, about assembly nature, since a fitting part decreases as it increases with an one-sheet lot, a two-sheet lot, a three-sheet lot, and --, it becomes easy.

[0038] Moreover, according to this example, as shown in drawing 2, it sets in the gestalt which circularized the expansion core 15. By the edge 13aR (14aR) portion of piece section of unit yoke 13a, and edge 13aL on the left-hand side of re-(14aL portions) Seen from the direction of a laminating, the

crevice 17 for connection section welding used as the concave of about V typefaces is formed, and the shell it was made to arc-weld this crevice 17 portion for connection section welding in the direction of a laminating, for example and the padding of welding do not project from a stator core 12.

[0039] Since the 1st iron core board 13 and the 2nd iron core board 14 are pierced by turns and formed, passing around the steel plate 35 for iron cores which is an iron core board material furthermore according to this example The 1st punch 32 for piercing edge 13aR and the portion between 13aL(s) which it excels in productivity and piece section of unit yoke 13a of the 1st iron core 13 counters in this case (29), The 2nd punch 30 for piercing edge 14aR and the portion between 14aL(s) which piece section of unit yoke 14a of the 2nd iron core board 14 counters (31) is used. Since the portion between edge 13aR of the piece section 13 of a unit yoke of the 1st iron core board 13 and edge 14aL of piece section of unit yoke 14a of the 2nd iron core board 14 is pierced, the punch number can be lessened.

[0040] By the way, in the above-mentioned example, although edge 13aL and 14aL groups, and edge 13aR and 14aR groups of unit yoke 15a fit in when circularizing the expansion core 15, by being crooked in the piece sections 13b and 14b of a connector of each iron core boards 13 and 14 at this time, the portion is compressed and it upheaves very slightly (refer to drawing 11 ). Since this protrusion 33 has lapped in the direction of a laminating one by one, the crevice G for double precision between height deltaH of a protrusion 33 generates it in each \*\* of the iron core boards 13 and 14. This serves as the following advantage and appears. That is, although edge 13aL and 14aL groups, and edge 13bL and 14bL groups of \*\*\*\*\* unit yoke 15a fit in by the culmination when circularizing an expansion core, when the above-mentioned crevice G occurs, the fitting margin cost for the crevice G minutes is made, and the fitting becomes easy.

[0041] Like drawing 22 incidentally shown as another conventional example, and drawing 23 , if piece section of connector T1a of each iron core boards T1 and T2 and the T1b portion have shifted to the hoop direction, between each iron core board T1 and T2, even height deltaH of Protrusion W generates only the crevice between parts, but is got blocked, and there will be little fitting margin cost and it will be hard coming to carry out the above-mentioned fitting. In addition, since height deltaH of the above-mentioned protrusion W is very slight, it is rare for big influence to appear in magnetic properties.

[0042] Drawing 12 and drawing 13 show the 2nd example of this invention, and set it in this example. Beveling formation of the portion (portion by the side of edge 13aL) which serves as an acute angle among the corners of the edge 13aL portion of each piece section of a unit yoke of the 1st iron core board 13 and 13aR portions is carried out (drawing 12 (a) shows the chamfer with 13m of signs). As the 2nd iron core board 14 is also shown in drawing 12 (b), it has the feature at the place which formed 14m of chamfers similarly.

[0043] At this example, among the edge 13aL portion of the 1st iron core board 13, and an edge 13aR portion, although one side is composition which serves as an acute angle from another side (the same is said of an edge 14aL portion and an edge 14aR portion), when circularizing from the state of the expansion core 15, other iron core boards may be damaged in the acute-angle portion. When magnetic pole teeth 15c is equipped with a coil 16 in the stage before circularizing the expansion core 15 especially, there is a possibility that the above-mentioned acute-angle portion may damage this coil, at the time of circularization. However, in this 2nd example, neither the iron core boards 13 and 14 nor a coil 16 is damaged in the case of circularization from having carried out beveling formation of the portion which serves as an acute angle among each edge of each piece sections 13a and 14a of a unit yoke of the 1st iron core board 13 and the 2nd iron core board 14 (refer to 13m of chamfers, and 14m).

[0044] Drawing 14 and drawing 15 show the 3rd example of this invention, and the following point differs from the 1st example in this example. Crevice 13u is formed in the periphery section of each piece section of unit yoke 13a of the 1st iron core board 13, and crevice 14u is formed in the periphery section of each piece section of unit yoke 14a of the 2nd iron core board 14. Therefore, crevice 15u for iron core board welding is formed in the periphery section of unit yoke 15a in the expansion core 15.

[0045] According to this example, the following effect is acquired. That is, although each iron core board may be welded in the periphery section of a unit yoke when unifying two or more iron core boards by which the laminating was carried out generally, the padding of welding may project from the

periphery section of a unit yoke in this case. However, according to the above-mentioned example, padding does not project in the periphery section by welding in the shell which formed crevice 15u for iron core board welding in the periphery section of unit yoke 15a, and this crevice 15u portion. Therefore, when fitting a stator 11 into the frame (not shown) of a motor, it can fit in smoothly.

[0046] Drawing 16 and drawing 17 show the 4th example of this invention, and the following point differs from the 1st example in this example. Crevice 13v is formed in the point of each piece section of magnetic pole teeth 13c of the 1st iron core board 13, and crevice 14v is formed in the point of each piece section of magnetic pole teeth 14c of the 2nd iron core board 14. Therefore, crevice 15v for iron core board welding is formed in the point of each magnetic pole teeth 15c.

[0047] According to this example, the following effect is acquired. That is, although it may weld by the point of magnetic pole teeth when unifying two or more iron core boards by which the laminating was carried out generally, the padding of welding may project from the point of magnetic pole teeth in this case. For this reason, it becomes difficult to make the gap of a stator core and Rota small. However, in this example, padding does not project from a magnetic pole teeth 15c point by welding to the point of magnetic pole teeth 15c in the shell in which crevice 15v for iron core board welding was formed, and this crevice 15v portion. Therefore, the gap of a stator core 12 and Rota (not shown) can be made small.

[0048] In addition, this invention is not limited to each above-mentioned example, may be changed as follows, for example, may be carried out. Not arc welding but laser welding is sufficient as a gestalt of welding. Moreover, you may make it use one side, forming the 1st iron core board and the 2nd iron core board in the same configuration, and reversing it.

[0049]

[Effect of the Invention] this invention can acquire the following effect so that clearly from the above explanation. While according to invention of claims 1 and 6 carrying out the laminating of two of the 1st iron core board and considering as a lot, the increase in iron loss can be suppressed aiming at improvement in the shell which carries out the laminating of two of the 2nd iron core board, considers as a lot, and was made to carry out the laminating of the two iron core board lot of these 1st, and the 2nd two iron core board lot by turns, and assembly-operation nature.

[0050] According to invention of claims 2 and 8, neither an iron core board nor a coil is damaged in the case of the shell which carried out beveling formation of the portion which serves as an acute angle among the corners for both ends of each piece section of a unit yoke of the 1st iron core board and the 2nd iron core board, and circularization. According to invention of claims 3 and 9, when joining one edge and other-end section of the connection section of an expansion core by welding, the padding of welding does not project from a stator core.

[0051] According to invention of claims 4 and 10, the crevice for iron core board welding is formed in the periphery section of a unit yoke, it can prevent that padding projects in the periphery section by welding in this crevice portion, and fitting to a motor frame becomes easy. According to invention of claims 5 and 11, by forming the crevice for iron core board welding in the point of magnetic pole teeth, and welding in this crevice portion, it can prevent that padding projects from a magnetic pole teeth point, and the gap of a stator core and Rota does not become large.

[0052] According to invention of a claim 7, since the 1st iron core board and the 2nd iron core board are pierced by turns and formed, passing the steel plate for iron cores around, improvement in productivity can be aimed at, and moreover, since the both sides of the punch used for the 1st iron core board punching and the punch used for the 2nd iron core board punching are used for punching of another portion, the punch number can be lessened. The fitting becomes easy, when according to invention of a claim 12 it circularizes the shell which piled up the piece section of a connector of each iron core board in the direction of a laminating one by one at the time of the laminating of each iron core board, and an expansion core and the edge parts of a \*\*\*\*\* unit yoke fit in.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

[Brief Description of the Drawings]

[Drawing 1] The drawing 7 B-B line cross section showing the 1st example of this invention

[Drawing 2] The plan of a stator

[Drawing 3] (a) is the plan of the 1st iron core board, and (b) is the plan of the 2nd iron core board.

[Drawing 4] (a) is the plan for an edge of the 1st iron core board, and (b) is the plan for an edge of the 2nd iron core board.

[Drawing 5] The plan of an expansion core

[Drawing 6] Drawing 5 A-A line cross section

[Drawing 7] The plan of an expansion core showing a state in the middle of circularization

[Drawing 8] Drawing showing the situation of manufacture of an iron core board

[Drawing 9] Drawing showing the situation of manufacture of the 1st iron core board

[Drawing 10] Drawing showing the relation between the number of sheets of an iron core board lot, and the rate of iron loss

[Drawing 11] The side elevation of a connector section portion

[Drawing 12] The drawing 4 equivalent view showing the 2nd example of this invention

[Drawing 13] Drawing 7 equivalent view

[Drawing 14] The drawing 3 equivalent view showing the 3rd example of this invention

[Drawing 15] Drawing 2 equivalent view

[Drawing 16] The drawing 3 equivalent view showing the 4th example of this invention

[Drawing 17] Drawing 2 equivalent view

[Drawing 18] The drawing 2 equivalent view showing the conventional example

[Drawing 19] Drawing 3 equivalent view

[Drawing 20] Drawing 7 equivalent view

[Drawing 21] Drawing 1 equivalent view

[Drawing 22] The partial plan of a stator core showing another conventional example

[Drawing 23] Drawing 11 equivalent view

[Description of Notations]

In 11, a stator and 12 the 1st iron core board and 13a for a stator core and 13 The piece section of a unit yoke, In 13b, the piece section of a connector and 13c a left end and 13aR for the piece section of magnetic pole teeth, and 13aL A right end, 14 the piece section of a unit yoke, and 14b for the 2nd iron core board and 14a The piece section of a connector, In 14c, a right end and 15 connect a left end and 14aR, the piece section of magnetic pole teeth and 14aL connect a unit yoke and 15b for an expansion core and 15a, in a coil and 17, the crevice for connection section welding, 19, or 32 shows punch, and 35 shows [ the section and 15c / magnetic pole teeth and 16 ] the steel plate for iron cores.

[Translation done.]

**\* NOTICES \***

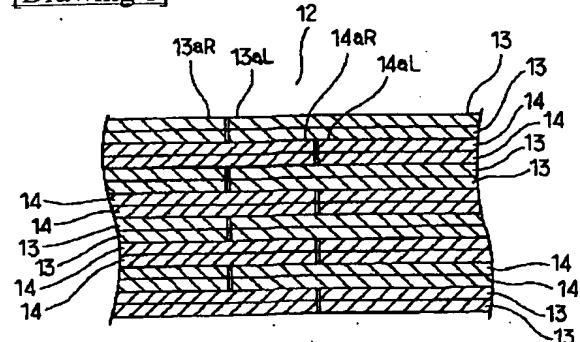
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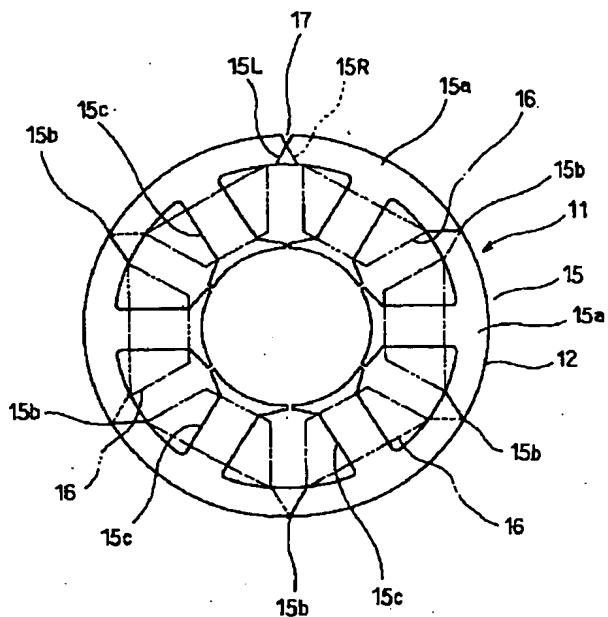
**DRAWINGS**

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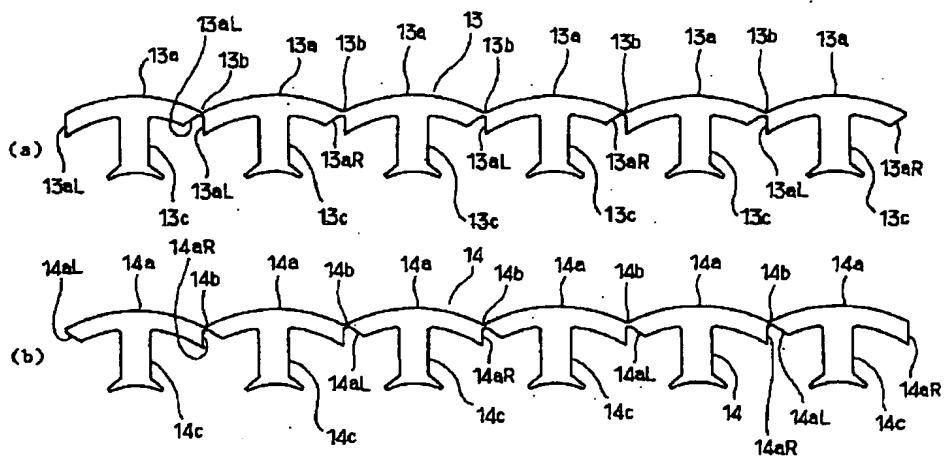
**[Drawing 1]**

12 : ステータコア  
13 : 第1の鉄心板  
13aL, 13aR : 端  
14 : 第2の鉄心板  
14aL, 14aR : 端

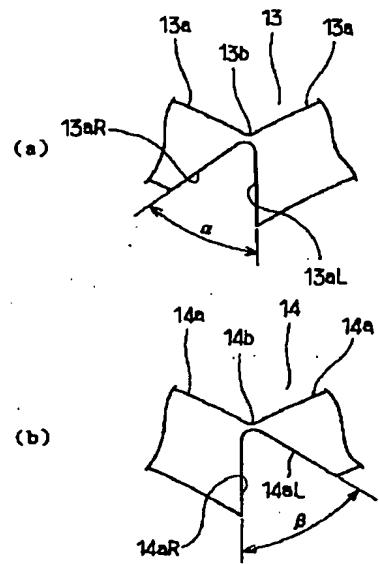
**[Drawing 2]**



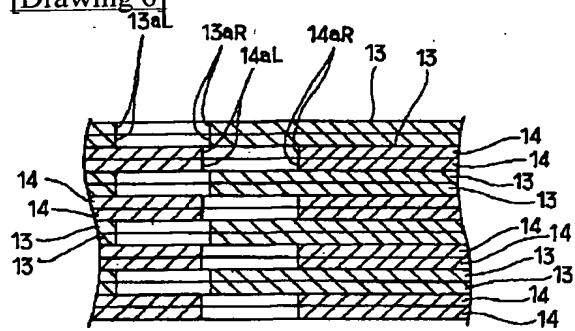
[Drawing 3]



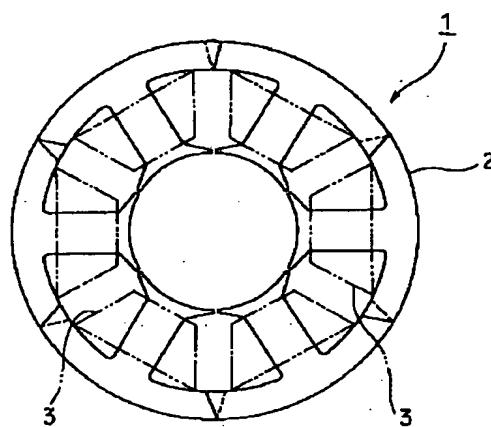
[Drawing 4]



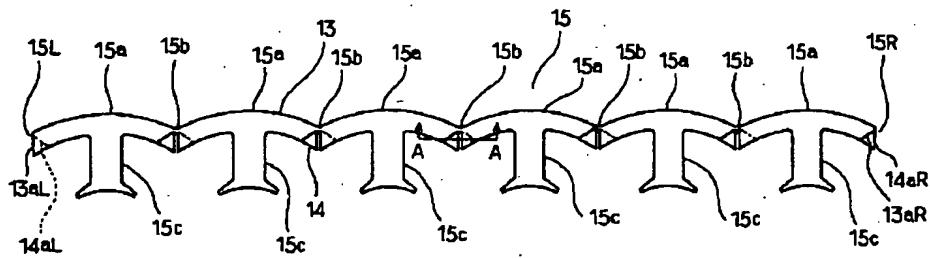
### [Drawing 6]



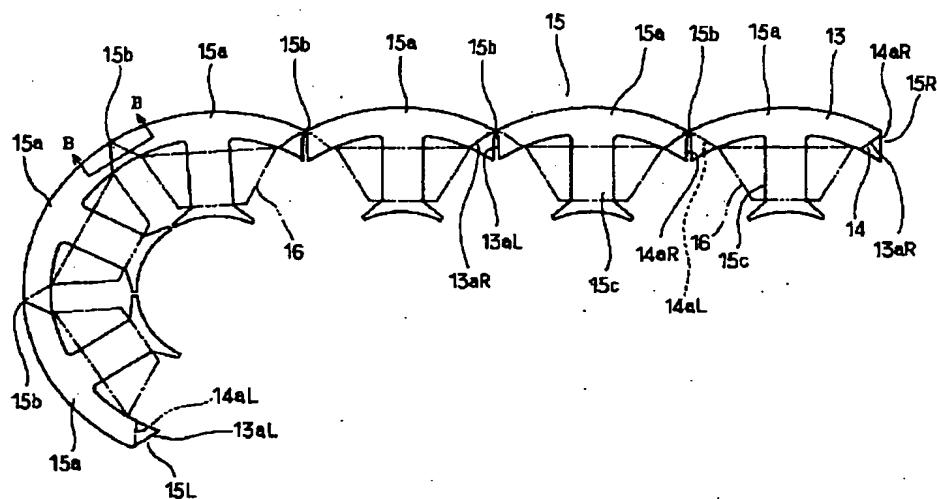
[Drawing 18]



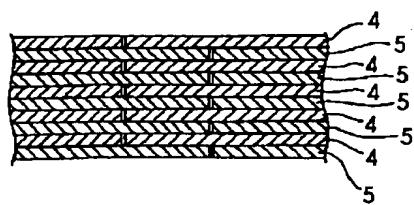
### [Drawing 5]



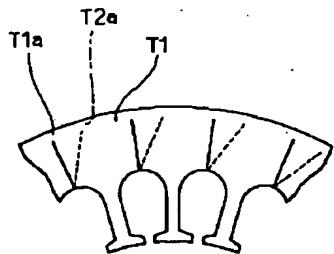
[Drawing 7]



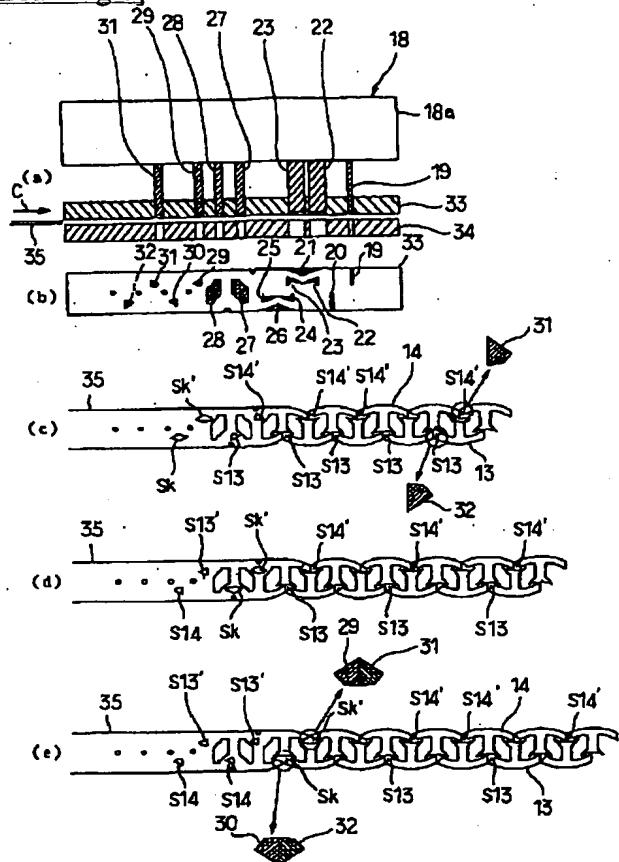
### [Drawing 21]



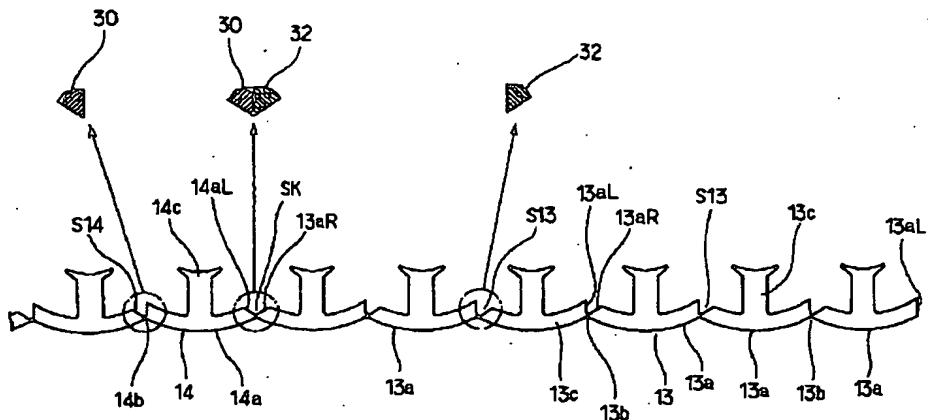
### [Drawing 22]



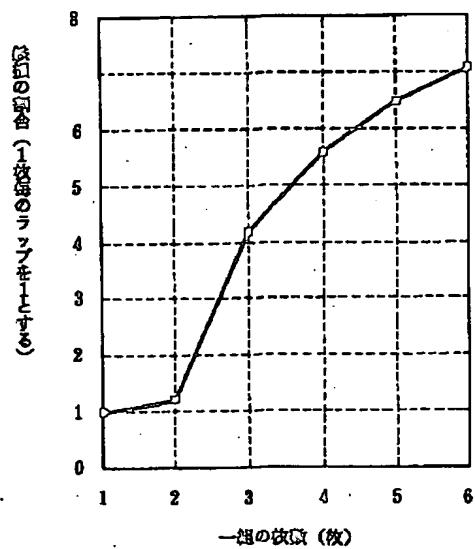
[Drawing 8]



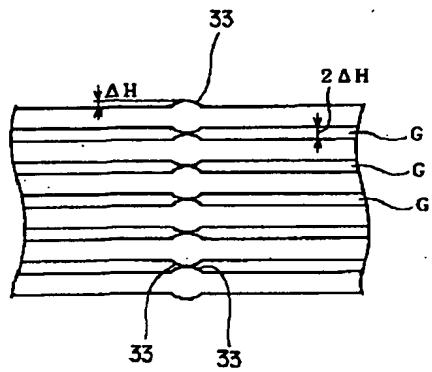
[Drawing 9]



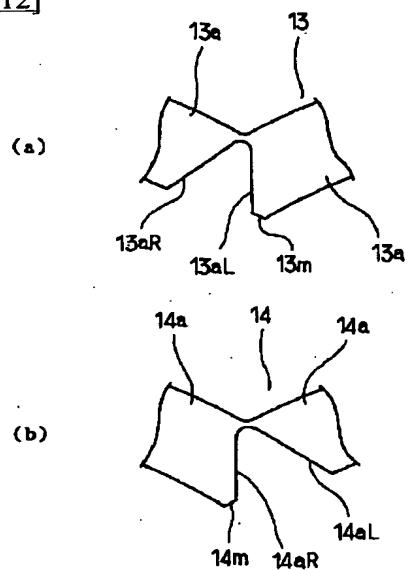
[Drawing 10]



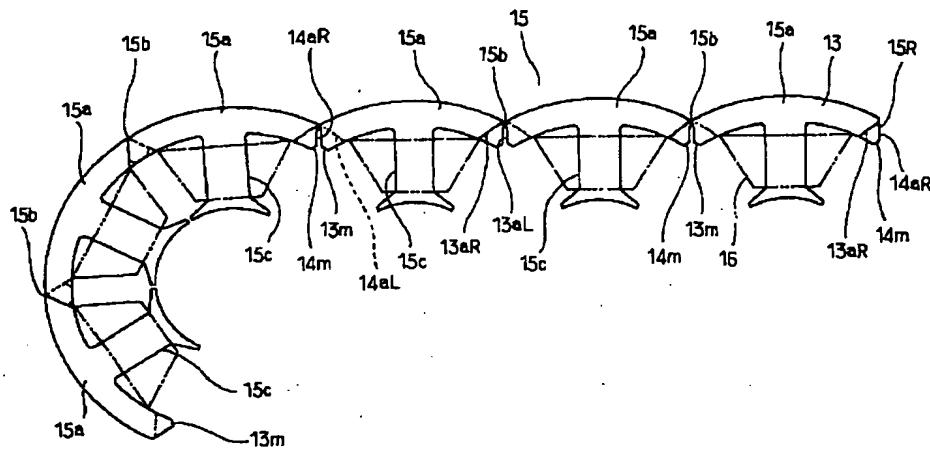
[Drawing 11]



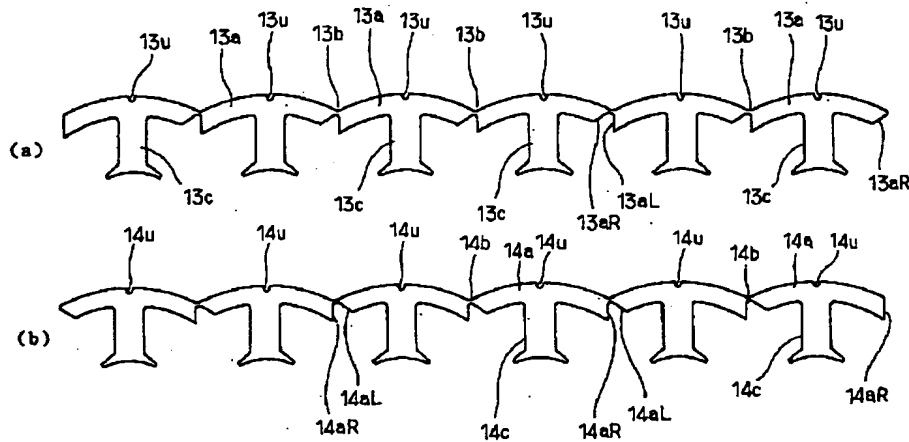
[Drawing 12]



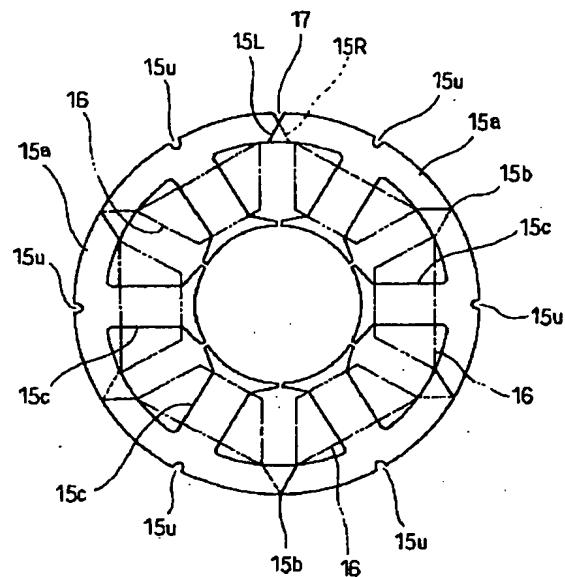
[Drawing 13]



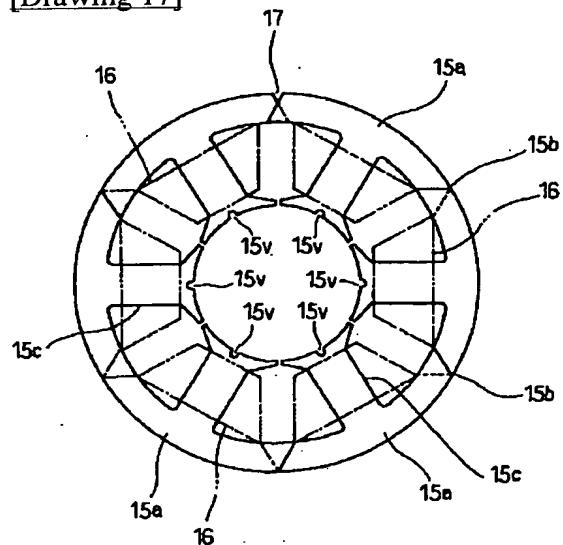
[Drawing 14]



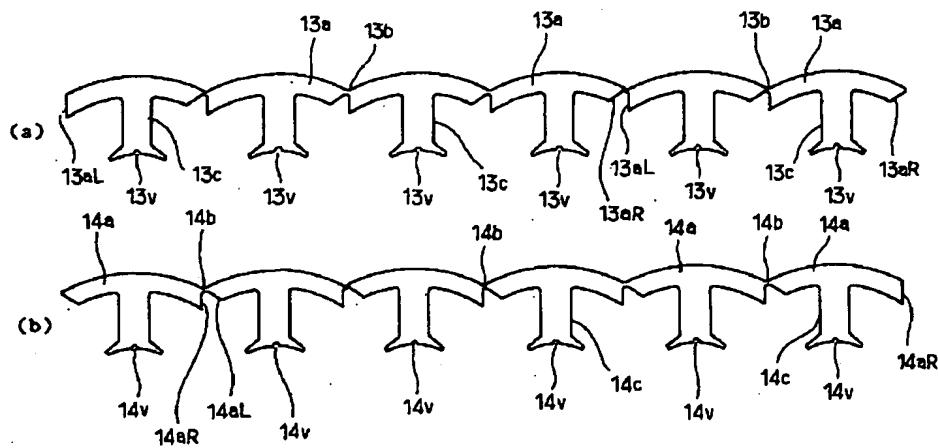
[Drawing 15]



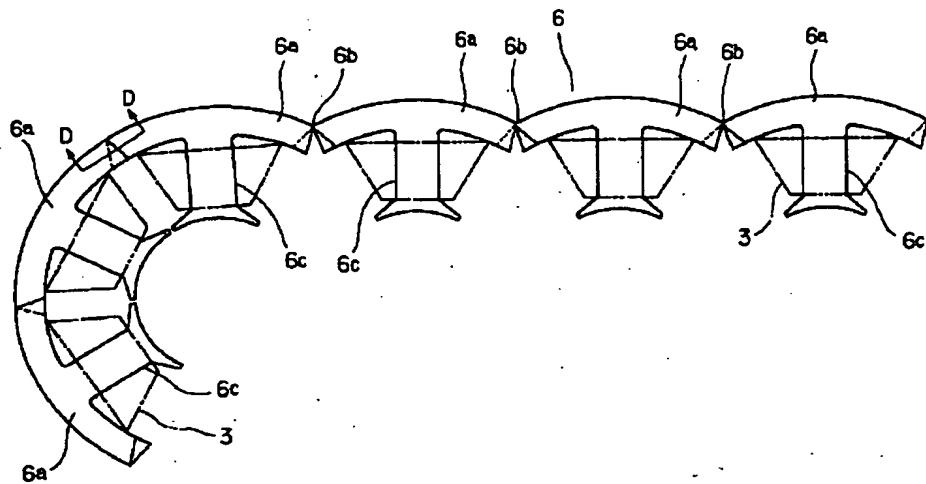
[Drawing 17]



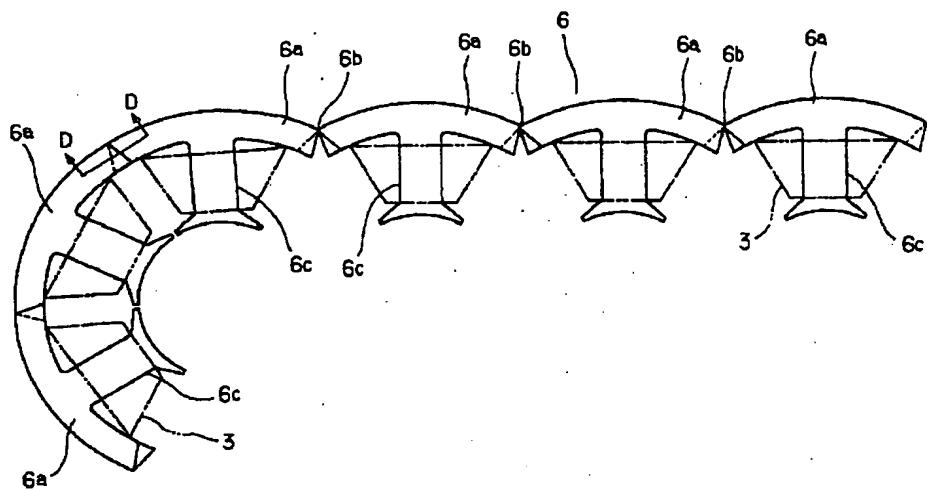
[Drawing 16]



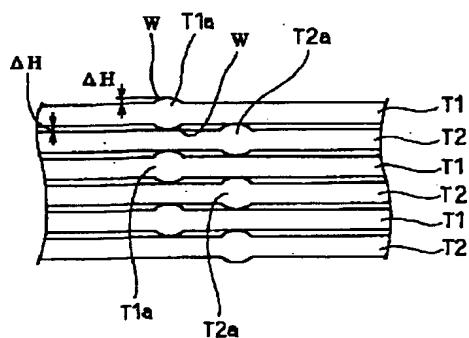
[Drawing 19]



[Drawing 20]



[Drawing 23]




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[Translation done.]